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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,222	12/20/2001	Yoshitarou Yazaki	01-241	4220

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LAW OFFICE OF DAVID G POSZ  
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EXAMINER

ALCALA, JOSE H

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 04/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/022,222

Applicant(s)

YAZAKI ET AL.

Examiner

Jose H Alcala

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM  
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 6-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-5, drawn to a printed circuit board, classified in class 174, subclass 264.
  - II. Claims 6-15, drawn to a method of making a printed circuit board, classified in class 29, subclass 829.
2. The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process, such as by instead of interconnecting electrically a plurality of conductor patterns with a unified conductive compound formed by hot-pressing the interlayer connecting material in the via-hole between a plurality of conductor patterns, the via-hole can be made with the desired dimensions and shape from the beginning and then the interlayer connecting material can be inserted into the via hole as a pre-formed plug.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with David G. Posz on 3/22/02 a provisional election was made without traverse to prosecute the invention of Group 1, claims 1-5. Affirmation of this election must be made by applicant in replying to this Office action. Claims 6-15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Drawings***

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: Reference number 39a and 39b of Figure 1D. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

7. Claim 2 is objected to because of the following informalities: In line 2, add the word: "through" between the words: "passing" and "a", in order to clarify the language of the claim. Appropriate correction is required.

Claim 5 is objected to because of the following informalities: In line 3, add the word: "a" between the words: "comprises" and "first"; in line 4, add the word "a", between the words: "and" and "second"; in line 5, add the word "a", between the words: "and" and "second", and in line 6 add the word "a" between the words "having" and "higher" and "melting" and between "than" and "heating"; in order to clarify the language of the claim. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "the unified conductive compound" in line 7. There is insufficient antecedent basis for this limitation in the claim. In addition, it is not clear in line 8, which one of the components is adjacent to an area contacting the conductor pattern. Furthermore, line 9 is not clear regarding which one of the conductor patterns is contacting the conductive compound.

Claim 5, lines 7-10 is not clear if the compound is unified how can the solid phase diffusion layer be formed between just the first metal and the metal making up the conductor pattern.

***Claim Rejections - 35 USC § 102***

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

11. Claims 1-4 are rejected under 35 U.S.C. 102(a) as being anticipated by Takubo et al. (US Patent No. 6,329,610). As best understood by the examiner:

Regarding Claim 1, Takubo et al. teaches a printed wiring board (Reference number 10) comprising: an insulator board (Reference number 21) having a via-hole (where Reference number 31 is located); a plurality of conductor patterns (Reference numbers 11a and 12 a) formed on the insulator board; and a unified conductive paste (Reference number 31) provided in the via-hole and electrically interconnecting the conductor patterns, wherein the unified conductive compound in the via-hole has an inclination of a side wall thereof (See Figure 1), which is adjacent to an area contacting the conductor pattern, against the conductor pattern in such a manner that the farther from the conductor patterns on the side wall, the closer to the center axis of the via-hole (See figure 1).

Regarding Claim 2, Takubo teaches that the side wall of the conductive compound has an arch shape on a cross-sectional plane passing a center axis of the via-hole. See Figure 1.

Regarding Claim 3, Takubo teaches that the insulator board thereof is made of thermoplastic resin (column 15, lines 65-66).

Regarding Claim 4, Takubo teaches that the conductive compound is made from metal particles (column 15, lines 50-51). The limitation that the compound is made of sintered metal is a product by process limitation. If the product in the product-by-process claims are the same as or obvious from a product of the prior art, the claims are unpatentable even though the prior product was made by a different process. See *In re Thorpe*, 227 USPQ 964,966 (Fed.Cir 1985). A "product by process" claim is directed to the product per se, no matter how actually made, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takubo et al. (US Patent No. 6,329,610). As best understood by the examiner:

Regarding Claim 5, Takubo teaches that the conductor pattern is made of metal (column 15, lines 50-51); and that the conductor pattern is electrically interconnected with a solid phase diffusion layer (it is inherently present between the conductor pattern and the filled through hole) that is formed by mutual solid phase diffusion between the metal making up the conductor pattern and the first metal in the conductive compound.

Takubo fails to explicitly teach that the unified conductive compound comprises a first metal forming an alloy with the metal making up the conductor pattern and second metal having higher melting point than heating temperature for interconnecting layers.

It is well known in the art to use alloys and different combinations of metals to insert into through holes, in order to get specific desired properties of the conducting material. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Takubo et al. to include that the unified conductive compound comprises a first metal forming an alloy with the metal making up the conductor pattern and second metal having higher melting point than heating




temperature for interconnecting layers, in order to get the specific electric and thermal properties desired for the operation of the device.

### **Conclusion**

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references have some of the elements of the instant claimed invention Chang (US Patent No. 4,303,715), Finley et al. (US Patent No. 4,221,925) and Schreiber et al. (US Patent No. 5,227,588).
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose H Alcala whose telephone number is (703) 305-9844. The examiner can normally be reached on Monday to Friday.
16. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.
17. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JHA  
April 8, 2002

  
Kleues  
Primary Examiner